

AMENDMENTS TO THE CLAIMS

1.-18. (Cancelled).

19. (New) A device, comprising:

a substrate of a semiconductor material; an array of sensing pixels fabricated over said substrate, each sensing pixel being responsive to input radiation to produce a pixel output representative of received radiation by said sensing pixel, wherein said sensing pixels are formed of multiple pixel layers; and

an optical mask layer formed over said substrate in an optical path of the input radiation, said optical mask layer having a plurality of optical elements to modify a property of the input radiation prior to detection by said sensing pixels, and wherein at least one layer of said multiple pixel layers is formed over said optical mask layer.

20. (New) The device as in claim 19, wherein said optical mask layer is formed atop of at least one layer of said multiple pixel layers.

21. (New) The device as in claim 19, wherein said multiple pixel layers forming said sensing pixels are fabricated on said substrate, and wherein said optical mask layer is between said multiple pixel layers and said substrate.

22. (New) The device as in claim 19, wherein multiple pixel layers forming said sensing pixels include a first set of contiguous multiple pixel layers and a second set of contiguous pixel layers fabricated on said substrate, and wherein said optical mask layer is formed between said first set and said second set.

23. (New) The device as in claim 19, wherein each optical element focuses the input radiation to a corresponding sensing pixel underneath said each optical element.

24. (New) The device as in claim 23, wherein said sensing pixels are formed of a first set of contiguous multiple pixel layers and a second set of contiguous pixel layers fabricated on said substrate, and wherein said optical mask layer is formed between said first set and said second set.

25. (New) The device as in claim 19, wherein each optical element selectively separates one color in the input radiation from another different color in the input radiation.

26. (New) The device as in claim 25, wherein said optical mask layer is between said multiple pixel layers and said substrate.

27. (New) The device as in claim 25, wherein each optical element spatially covers only one sensing pixel.

28. (New) The device as in claim 25, wherein each optical element spatially covers at least two adjacent sensing pixels.

29. (New) The device as in claim 19, wherein each sensing pixel is an active pixel which has in-pixel circuit elements to convert radiation-induced charge into a current or voltage.

30. (New) The device as in claim 19, wherein each optical element spatially covers only one sensing pixel.

31. (New) The device as in claim 19, wherein each optical element spatially covers at least two adjacent sensing pixels.

32. (New) The device as in claim 19, wherein each optical element both focuses a beam and spectrally filters the same beam.

33. (New) The device as in claim 19, wherein each optical element is optically absorptive.

34. (New) The device as in claim 19, wherein each optical element is optically reflective.

35. (New) The device as in claim 19, wherein each optical element is optically refractive or diffractive.

36. (New) A device, comprising:
a substrate of a semiconductor material;

a plurality of pixel layers formed over said substrate and patterned to define an array of sensing pixels, each sensing pixel being responsive to input radiation to produce a pixel output representative of received radiation by said sensing pixel;

a first optical mask layer formed over said substrate in an optical path of the input radiation, said first optical mask layer having a plurality of optical elements to optically interact with the input radiation; and

a second optical mask layer formed between said first optical mask layer and said substrate, said second optical mask layer separated from said first optical mask layer by a set of contiguous pixel layers and having a plurality of optical elements to optically interact with the input radiation that pass through said first optical mask layer.

37. (New) The device as in claim 36, wherein each optical element in said first and said second optical mask layers focuses received radiation.

38. (New) The device as in claim 36, wherein each optical element in said first optical mask layer focuses received radiation and each optical element in said second optical mask layer separates one color from another different color in the input radiation.

39. (New) The device as in claim 36, wherein said second optical mask layer is formed between said pixel layers and said

substrate, and said first optical mask layer is formed atop of said pixel layers.

40. (New) The device as in claim 36, wherein each sensing pixel is an active pixel which has in-pixel circuit elements to convert radiation-induced charge into a current or voltage.

41. (New) A device, comprising:

a substrate of a semiconductor material;

an array of sensing pixels fabricated over said substrate, each sensing pixel being responsive to input radiation to produce a pixel output representative of received radiation by said sensing pixel; and

an optical mask layer formed over said substrate in an optical path of the input radiation, said optical mask layer having a plurality of optical elements to modify a property of the input radiation prior to detection by said sensing pixels, wherein each optical element both focuses a beam and spectrally filters the same beam.

42. (New) The device as in claim 41, wherein said sensing pixels are formed of multiple pixel layers, and wherein at least one layer of said multiple pixel layers is formed over said optical mask layer.

43. (New) The device as in claim 42, wherein said optical mask layer is formed atop at least one layer of said multiple pixel layers.

44. (New) The device as in claim 41, wherein said sensing pixels are formed of multiple pixel layers, and wherein said optical mask is formed atop at least one of said multiple pixel layers.

45. (New) The device as in claim 41, wherein said optical mask is formed over said sensing pixels.

46. (New) The device as in claim 45, wherein each optical element spatially covers only one sensing pixel.

47. (New) The device as in claim 45, wherein each optical element spatially covers at least two adjacent sensing pixels.

48. (New) The device as in claim 41, wherein said sensing pixels are formed of a first set of contiguous multiple pixel layers and a second set of contiguous pixel layers fabricated on said substrate, and wherein said optical mask layer is formed between said first set and said second set.

49. (New) The device as in claim 41, wherein each sensing pixel is an active pixel which has in-pixel circuit elements to convert radiation-induced charge into a current or voltage.

50. (New) The device as in claim 41, wherein each optical element spatially covers only one sensing pixel.

51. (New) The device as in claim 41, wherein each optical element spatially covers at least two adjacent sensing pixels.